II.G. Determining the Funding Gap and Additional Funding Options

When a funding gap exists between estimated costs and revenues, municipal managers need to identify additional resources to bridge the difference. The funding gap between estimated costs and the selected revenue options, calculated by subtracting the final annual utility revenue from the total annual program costs, can be closed by exploring additional revenue and financing options. Many of these were highlighted in Section I.

Potential options all provide funds for projects, but not all are revenue. Funding sources such as sales taxes are revenue-producing, whereby they generate revenue for the municipality. Bonds and loans with interest, however, are financing mechanisms. They can be effective ways to generate capital that pays for projects, but regular bond payments must be paid over the term of the debt via revenue-bearing sources. Various options for raising revenues are detailed below.

Revenue Sources

1. *Local Development and Realignment Fees*. Municipalities directly charge developers a variety of fees for newly connecting to existing systems, inspection and permitting activities, reviewing site plans, mitigation and impact assessments, and other activities.
2. *State Government Grant Programs*. While the federal government has limited money available for stormwater-related grants, some states provide grant programs for specific tasks related to stormwater management. For instance, in California, the Integrated Regional Water Management Grant program offers grants for watershed management activities, while the Stormwater Grant Program offers grants to municipalities for municipal stormwater infrastructure. The grant programs are funded through general funds or other sources. They often require a match from communities of revenue or in-kind contributions such as time and labor. Some federal and state grant programs fund specific tasks related to stormwater permit compliance (NPDES activities) or environmental cleanup. Others, such as the Clean Water Act's 319(h) NPS Grant Program fund activities, monitoring, and outreach for non-point sources.
3. *Local Option Sales Taxes*. In some jurisdictions, a special-purpose sales tax has been enacted, whose revenues are earmarked for a specific task such as developing stormwater infrastructure. As an example, the Los Angeles region of California passed Measure M in 2016, which designated $860 million of annual revenue from a $0.05 sales tax to transportation projects.
4. *Designated Special District Fees*. Some states have various types of "special districts" that are approved to fulfill a designated purpose, such managing stormwater infrastructure, and have taxable authority within a jurisdiction. In California, Benefit Assessment districts, designated in 1982, provide authority of local governments and other entities to finance municipal infrastructure and operations. The advantage of a special district is to spread costs and responsibilities over the entire area where the management need exists, which often crosses existing jurisdictions and cities.

Financing Sources

1. *Bonds*. Municipalities and states regularly use bonds to finance infrastructure development. Through bonds, governments raise revenue and agree to pay back the fronted cost of capital over time with interest. Therefore, bonds (and loans) do not truly fill funding gaps. Instead, they transfer costs to the future. A variety of bonds are relevant for stormwater infrastructure

development, including general obligation bonds, popularly-approved bond propositions (especially in California), and "Green Bonds" that are designated specifically for projects with environmental benefits, and recent "Environmental Impact Bonds" that assemble public and private partners to build and maintain systems over time to meet water quality goals.

2. *Federal and State Loan Programs*. The Clean Water State Revolving Fund is an example of a federal-state revolving loan program that provides an application-based source of capital for building projects. Loans must be paid back over time. In many states, federal and state funds both contribute to monies available for distribution.

The availability of options varies across states, depending on local legislative acts that provide additional mechanisms of authority to unilaterally or jointly raise funds and implement taxes. A number of resources currently exist that provide significant detail on these options. The US EPA hosts the Water Finance Clearinghouse with a repository of qualitative and quantitative information on funding water infrastructure in the US. In 2018, the California State Water Resources Control Board released a document describing existing stormwater funding options especially relevant for California (STORMS 2018). Additionally, as of late 2018, the California Stormwater Quality Association (CASQA) released a Stormwater Funding Resource Portal that includes current grant and load funding opportunities.[3]

Stormwater-related projects can potentially be 'subsidized' by other agencies or municipal departments based on assessment of mutual benefits for contributing parties. Some example projects include implementing capture and use projects, using stormwater to maintain minimum sewer flows, installing trash capture devices, and performing street sweeping.

Finally, if all funding options have been exhausted, a method for bridging the funding gap is to lower the LOS and associated stormwater program annual cost. Similar to determining a reasonable CPH, this process can be iterative. Several versions may be necessary to achieve a satisfactory LOS at an acceptable cost.

II.H. Public Education and Outreach

Ultimately, a stormwater financing plan that includes taxes or fees will need public support and approval. In California, since stormwater parcel taxes are currently considered to be local taxes subject to the Proposition 218 approval process, public support is necessary.

While public engagement throughout the asset management and finance plan development processes will improve and shape the outcomes, once a rate structure is proposed and is approved for adoption or public ballot by local leaders, municipalities have responsibility to inform the public. In states everywhere, informing the public of how funds will be spent and long-term plans for financial management will foster confidence that public agencies can responsibly manage new revenues. For voter-approved processes in California, municipalities are required by law to inform residents and/or property owners of a pending ballot measure in advance of voting.

While cities themselves cannot advocate for a voter ballot measure in California, they do have the responsibility to educate voters. Moreover, outreach efforts to date that solicited input among

[3] The CASQA Stormwater Funding Portal is publicly-available at: https://www.casqa.org/resources/funding-resources

stakeholders and interested community groups often help foster champions, which rally support, funding, and publicity for the cause as elections approach. Thus, the public engagement activities undertaken earlier in the process can usefully feed into the necessary public education requirements that are part of voter-approved ballot measures.

The methods described above and in the Sacramento State EFC toolkit are intended to provide program managers a starting point to develop a preliminary financing plan that can be shared and used to begin informed conversations. A master plan that details infrastructure needs, current and future spending projections, and plans for equitably distributing revenue is an important, if essential, product for communicating needs with stakeholders and the public.

To facilitate public support, a public information program should be outlined. The goal of such program is to educate community leaders, decision-makers, and the public about the need for a stormwater fee and the community benefits of an adequately funded stormwater program. Elements of this program include public meetings, informational pamphlets, a website, and an advisory committee (EPA 2009). The City of Palo Alto, who approved a stormwater utility in 2017, provides a good example of communicating stormwater fee needs, planning, and community outreach using web pages (Figure 10): https://www.cityofpaloalto.org/news/displaynews.asp?NewsID=3679.

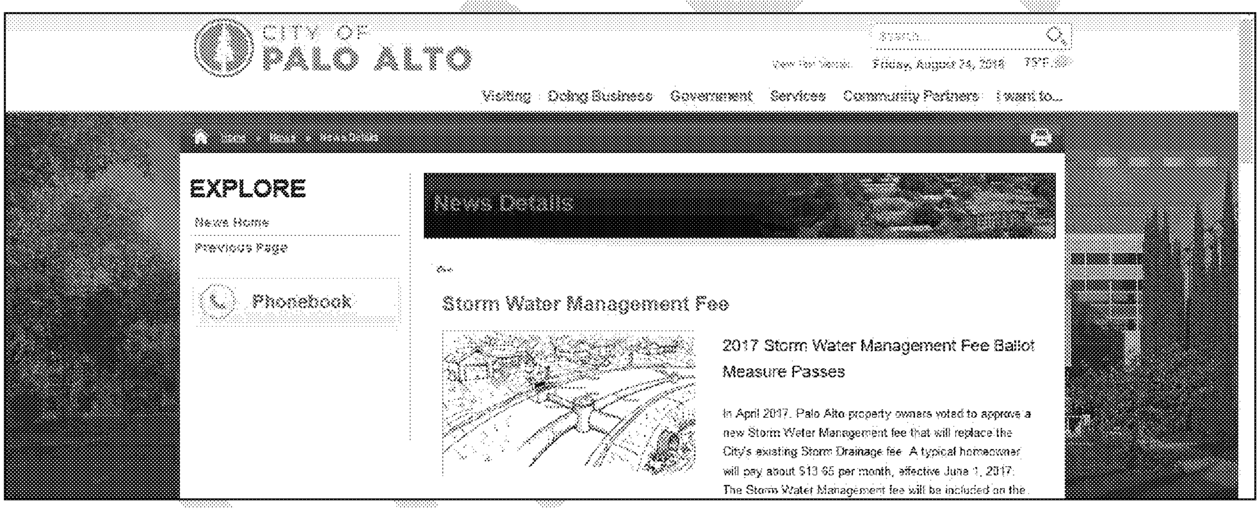

Figure 10. City of Palo Alto Website Communicating Stormwater Fee Process

III. Toolkit Preview

The Sacramento State EFC stormwater asset management and funding toolkit consists of three workbook templates to support development of a stormwater utility fee:

1. ***Asset Inventory Workbook***
2. ***Total Costs Workbook***
3. ***Rate Structure Analysis Workbook***

The workbooks and associated contents were highlighted throughout Section II, and are further summarized below. The workbooks were created to support step-by-step procedures. They generally fit together as shown in Figure 11. Each workbook has an "Instructions" tab with more details.

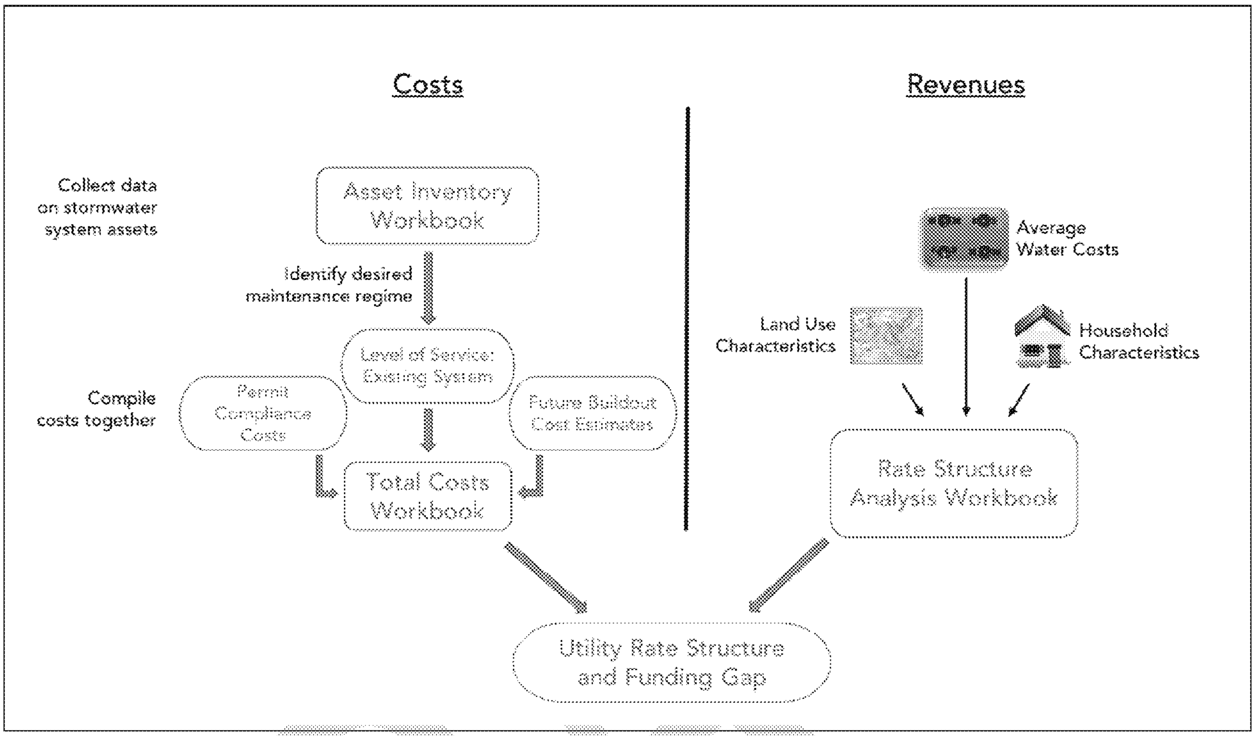

Figure 11. Content and Flow of the Sacramento State EFC Stormwater Financing Toolkit

III.A. Asset Inventory Workbook

The *asset inventory workbook* is intended to list all asset and relevant information in order to prioritize them for maintenance and replacement. The information entered in and calculated by the asset inventory workbook can be used to develop O&M schedules and then cost estimates. The workbook includes the following worksheets:

- **Instructions**: descriptions of how to use the workbook
- **Asset Inventory Worksheet**: table listing each asset and various characteristics. The characteristics are used to calculate POF and COF scores, which in turn are used to prioritize assets for maintenance and replacement.
- **Multi Factor COF Worksheet**: table recording asset characteristics such as proximity to floodplains, buildings, or contaminated soils, than can be used to quantify a COF score. Alternatively, a single factor COF quantitative measure (ranging negligible to severe) can be selected on the asset inventory worksheet to calculate the COF score, making the multi factor COF worksheet unneeded.
- **Prioritization Worksheet**: table summarizing and sorting the assets and characteristics by a combined POF and COF score

- **References**: tables summarizing assumptions and values used in look up functions in the asset inventory and multi factor COF worksheets

III.B. Total Costs Workbook

The t*otal costs workbook* computes an annual sum of costs for O&M of existing assets, permit compliance activities, and future new infrastructure.

The total costs workbook includes the following worksheets:

- **Instructions**: descriptions of how to use the workbook
- **Summary**: table summarizing costs entered and calculated in other worksheet for 1) O&M of existing assets, 2) permit compliance, 3) future buildout. Costs for future O&M and permit compliance activities are also presented. They are projected using an inflation factor entered on the *inputs worksheet* (see below).
- **Inputs**: placeholders for manually entered data such as assumed inflation factor for projecting future costs and year of initial cost estimates.
- **O&M Costs for Existing Assets**: table summarizing costs for O&M of existing assets based on a defined LOS and the associated costs estimates from the worksheets below.
    - **LOS Summary Template**: table summarizing O&M activities and costs for various asset categories and LOS's
    - **Grand Rapids LOS Summary Example**: example of how the *LOS summary template* can be populated
    - **Detailed Costs Template**: tables detailing specific costs (labor, material, etc.) for O&M activities used to tabulate costs in LOS Summary Template
- **Permit Costs Summary**: table of costs for permit compliance activities, based on detailed cost estimates from the following worksheets
    - **Permit Category 1 Costs**: costs for construction site stormwater control compliance
    - **Permit Category 2 Costs**: costs for illicit discharge detection and elimination compliance
    - **Permit Category 3 Costs:** costs for industrial and commercial management compliance
    - **Permit Category 4 Costs:** costs for pollution prevention of municipal operations
    - **Permit Category 5 Costs:** costs for post construction stormwater permit compliance
    - **Permit Category 6 Costs:** costs for public education, outreach, involvement, and education
    - **Permit Category 7 Costs:** costs for water quality monitoring
    - **Permit Category 8 Costs:** costs for overall stormwater program management
    - **Permit Category 9 Costs:** costs for long-term planning (e.g., TMDL compliance or watershed management collaboration)
- **Future Buildout Costs:** table summarizing costs of projects to be constructed in the future.

III.C. Rate Structure Analysis Workbook

The *Rate Structure Analysis Workbook* includes a generalized method for quantifying the potential revenue from implementing flat fee or equivalent residential unit (ERU) assessments for a community. It aggregates several data sets, which must be collected:

1) Land use and parcel data in a municipality

2) Estimates of household income
3) Existing household costs for water and wastewater utility services

The rate structure analysis workbook includes the following worksheets:

- **Instructions**: descriptions of how to use the workbook
- **Data and Inputs**: tables recording
    - water use, property sizes, and imperviousness data
    - land use data
    - water and sewer utility rates
    - inflation rates
    - assumed stormwater fee increases
- **ERU-Single**: tables that project potential revenue for user entered ERU single rate assumptions and calculate the percent of MHI as a measure of affordability
- **ERU-Tiered**: tables that project potential revenue for user entered ERU tiered rate assumptions and calculate the percent of MHI as a measure of affordability
- **ERU-Reverse**: tables that calculate an ERU based on required revenue
- **Regional Tariff Data**: tables summarizing stormwater utility fees and rate structures implemented by various municipalities in California and the US

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Appendix A: Common Methods for Developing a Rate Structure

Background
As noted in the Technical Memo (TM), three basic methods for developing a rate structure were considered by the EFC: 1) Flat fees, 2) the Equivalent Residential Unit (ERU) method, 3) the Intensity of Development (IoD) method, and 4) the Equivalent Hydraulic Area (EHA) method (EPA, 2009).

The ERU method results in a consistent fee charged to properties based on the property type (e.g., single family residential, multi-family, commercial, and industrial). ERU rate structures are popular and an easy method to implement that accounts for some local conditions of imperviousness, but they do not consider the contributions of pervious surface area to stormwater runoff. Additionally, ERU rate structures are based only on a sample set of assessed impervious areas deemed representative of the larger community; they are not based on the actual imperviousness (or perviousness) of each property. Other methods that consider more continuous assessments of surface area (i.e., $/sqft) may be more equitable, especially in applying tariffs to larger properties with greater contributing surface area. Below, we provide further descriptions of the other two methods that address some of the ERU's shortcomings through alternative rate structures and additional data needs. For each, we assessed applicability of the method for California municipalities based on a review of literature and survey of available data.

Other Rate Structure Methods
Of the two additional methods developing stormwater fee rate structures summarized below, the EFC is developing an open-source data set for parcel-specific quantifications of pervious and impervious surface area in urban areas of the Region 9 territory. The classification methodology is being tested against training sets for two service territories. If successful, it will be applied to the entire region for use in more complex stormwater fee assessment methods.

Intensity of Development (IoD) Method
The ***Intensity of Development (IoD)*** method categorizes rates based on the relevant extent of their development, as represented by their assessed impervious surface area. Properties with less development (less imperviousness) might include light and medium residential land uses, while properties with more development (more imperviousness) could include commercial and industrial sites.

The fee structure is organized as a "sliding scale" so that properties with heavy development pay more. For instance, vacant properties or light development land uses might pay $0.10 per unit (1,000 sq. ft. or other metric), while properties with heavy development would pay more per unit.

While the IoD rate structure is based on representative blocks associated with impervious surface coverage, the method does require utilities to quantify the total area for each property and the amount of impervious surface area for the property. Additionally, it does not account for pervious surface area of properties, which can still contribute to stormwater runoff.

Equivalent Hydraulic Area (EHA) Method
Finally, the ***Equivalent Hydraulic Area (EHA)*** method assesses property-level stormwater fees based on a continuous fee structure that incorporates both impervious and pervious area. This requires utilities to calculate the area of pervious and impervious surface cover for each property in the service territory. The sum of these two values should be equal to the total property area.

Similar to the IoD method, a unit-based assessment rate ($/sq-ft or equivalent) is assigned to each property classification, often with a different rate for impervious areas and pervious areas. Pervious cover would have a significantly lower assessment rate, as it contributes less to stormwater runoff. Although this method is data intensive, it better attributes fees for stormwater services more equitably than the ERU method, which applies consistent fees across properties of many sizes. The EHA method also considers the contribution of pervious surface area, while the ERU and IoD methods typically do not.

Once impervious and pervious surface cover is determined for each property, a few approaches could be used in devising a fee structure. For instance, a single unit fee for pervious and impervious area ($/square foot or $/1000-sq-ft) could be devised based on the ratio of the entire cost of the chosen stormwater program (quantified through a procedure such as the *Total Costs Workbook*) and the utility service area. Alternatively, separate unit fees could be developed for perviousness and imperviousness of different property types (residential, commercial, industrial), which would assume that the activities of certain land use types contribute more per unit area to stormwater contaminants than other land uses. This approach could be useful to account for activities of commercial and industrial properties.

Data Requirements

The IoD and EHA methods both minimally require an assessment of property-level imperviousness. As noted, greater access to data and mapping software offers new opportunities for instituting rates based on these procedures. In particular, high-resolution and detailed geospatial data is required for:

1) Land cover and imperviousness from imagery,
2) Property (parcel) boundaries, and
3) Unique identifiers within a database that support the capacity to associate properties in a GIS file with utility billing records.

In California, recent developments to promote urban water use efficiency during the 2011-16 drought have led to several efforts to create statewide imagery datasets. The imagery data developed for these applications have additional potential for estimating land cover and imperviousness. Some areas of California, too, have high-resolution imagery available, such as Los Angeles through the Los Angeles Area Regional Imagery Acquisition Consortium (LARIAC).

For properties, utilities must have an underlying billing database that contains unique identifiers for relating properties from state or regional geospatial files of parcels with billing records. The California Office of Planning and Research (OPR) developed a statewide parcel data set, which many municipal utilities have linked with billing records and even local tax assessor databases that contain property information. If utilities do currently have databases capable of relating the geospatial (property area and estimates of property-level impervious/pervious surface cover) and billing data, GIS analysis with geocoding can be performed to associate mailing addresses in utility databases with geospatial data. Many tools exist for geocoding, with more robust tools being proprietary. Geocoding to match addresses and parcels is an iterative process, with inconsistencies in address records often contributing to failed matches for some properties. Depending on the source data, match rates can range from less than 50% to 90% for initial matches. Thus, utilities with unique identifiers matched to regional or statewide geospatial parcel databases are better positioned to implement the IoD or EHA methods.

As part of this work to develop stormwater fees, the EFC compiled and assessed data from multiple sources that would support property-level estimates of imperviousness. Generally, available land cover and imagery data ranges from low-resolution (30-meter) that is not adequate for property-level imperviousness assessments, to very high-resolution (3-inch) that is ideal for such assessments. Thirty-meter and 1-meter data are openly-available through national sources. Higher-resolution data (6-inch and 3-inch) is typically acquired by working with commercial imagery providers, which can assist in processing data to categorize various attributes such as building outlines, pervious and impervious surface cover, plant cover and trees, and irrigated area. Table 1 below details the available data sources surveyed for California related to stormwater fees.

Some stormwater municipalities purchase commercial imagery in support of estimating impervious and pervious surface coverage on properties in their service territory. For others, however, insufficient local resources exist to purchase data. In these territories, freely available imagery would be a cost-effective solution. The National Agricultural Imagery Program (NAIP) offers 1-meter imagery data that can be used to classify impervious and pervious surface area for properties. The EFC is currently working with partners and collaborators to develop an open-source statewide dataset for impervious surface coverage, which would support stormwater fee development activities by utilities throughout the state.

Equity Considerations

As noted in the TM, stormwater fees must incorporate equity considerations, using a Cost per Household (CPH) or similar measure that ensures as best as possible that disadvantaged communities are not unfairly burdened. In creating rate structures that more closely connect imperviousness (and potentially total property size with perviousness) and total fees, the IoD and EHA methods can help address some inequities of the ERU method by ensuring that larger properties contribute more revenue through fees.

Yet, such IoD block rates or continuous rate structures still may not fully alleviate disproportionate burdens on low-income households. As such, for either of these two methods, a similar procedure to estimate CPH and apply it to proposed rate structures is necessary. An adapted EPA FCA method would be organized as follows:

1) Calculate the CPH and determine its reasonableness using steps 1-5 of the "Conduct Financial Capability Analysis" section of the TM;
2) Assign a rate structure based on the adjusted CPH.
3) Calculate the average cost per household using the rate structure and property-level impervious/pervious surface area estimates for a high-detail geographic area, such as Census block groups, which have associated characteristics for Median Household Income.
4) Identify any areas of the utility service territory where average household costs exceed CPH. If these exist, devise low-income credit programs or adjust the rate structures accordingly to yield a similar amount of total revenue but alleviate disproportionate burdens on disadvantaged households.
5) If all areas of the utility service territory has average household fees (through the IoD or EHA method) that are less than or equal to the CPH, the devised fee structure can be retained.

Table 1: Available data sources in California for estimating fees using Equivalent Hydraulic Area (EHA) methods

Data	Source	Resolution	Availability and Comments
Land Cover and Imperviousness			
National Land Cover Database (NLCD)	Multi-Resolution Land Characteristics (MRLC) consortium	30-meter	Open-source, but too coarse for parcel-level assessments
National Agriculture Imagery Program (NAIP)	USDA Farm Service Agency	1-meter	Open-source. Requires image processing to identify imperviousness. Can be a source for determining property-level imperviousness, but many utilities are using much high resolution imagery.
LARIAC1 (2006), LARIAC2 (2008), and LARIAC3 (2011), and LARIAC4 (2016) Imagery	Los Angeles Region Imagery Acquisition Consortium (LARIAC) Program	4”-12”	Specific to LA County. Open-source for 2006, 2008, and 2011 (2016 version is available for purchase). Contains layers for buildings, terrain, tree cover, NDVI and solar, hillshading, color, imperviousness, and infrared imagery. Imagery at various resolutions from 4”-12”.
DWR purchased imagery data	California Department of Water Resources (DWR)	6-inch	Imagery purchased by DWR to support statewide assessment of irrigable and irrigated area in water districts in support of devising water budgets to meet requirements from EO-B37-16. Imagery data may be available in the future (2018) to assess impervious surface area across state agencies.
Google Earth	Google	varies	*Google Earth* software contains aerial imagery and tools to measure distance and area. The imagery is available, sometimes over time, and free but laborious for determining imperviousness for all properties in a utility territory.
Property (Parcel) Boundaries			
California statewide parcel database	California Office of Planning and Research (OPR)	n/a, shapefile	Developed by OPR with standardized identifiers for parcels and boundaries, which can be used to merge with utility databases and billing records.

Appendix B: Projecting Future Costs

In projecting future costs, financial best practices should be used. The task of projecting future costs is always subject to assumptions and selected methods. Cost estimates should clearly state whether they are *real* or *nominal*. Real costs are adjusted for inflation, whereby the costs of a project in future years can be directly compared to the cost in a current year. Nominal costs, on the other hand, are not adjusted for inflation and are reported as the amount that must be spent in that year, which can be useful when comparing to revenues. Both are valid methods of reporting financial projections, but detailed descriptions of assumptions are necessary to incorporate into asset management.

Costs of future projects may be reported as total capital costs and/or as unit values. Total costs are the full amount to be spent on a project, which must often be provided to builders up front and is subsidized by revenue from an investment or bond. However, to compare the financial feasibility of various options, total costs are often converted to unit costs as well, which can allow for comparing various new options, along with benchmarking to existing infrastructure costs. Unit costs can be reported as:

1) *Capital costs per projected capacity*, which is the total design and construction cost divided by a projected numerical output, such as volume of water captured or volume of water treated. This helps gauge the efficiency and viability of the actual construction process.
2) *Long-term performance costs*, which account for the projected returns that a project will yield. This allows decision-makers to understand the expected long-term returns for a project that must be paid for now but financed over the long-term.

While project costs for infrastructure occur up front, such investments yield long-term returns. These are captured by annualizing costs over a long period of time that is equal to the estimated lifetime of the new project. The lifetime unit costs would be the total costs (construction and long-term maintenance) divided by the total lifetime expected capacity or output. The unit costs can also be annualized based on an assumed discount rate to account for the changes in the value of money over time. The EFC has provided guidance to communities in standardizing estimates for current and future costs.

Notably, estimates of future costs should be for new infrastructure that 1) meets water quality and flood control/drainage goals and 2) is under municipal control. Costs to municipalities for future build outs on private lands, which are directly covered by private development fees, would not be included in the assessment through this approach.

The unit cost metrics help in comparing options in terms of benefits and value, but cost estimates and accounting can become even more detailed. For instance, the costs of a given project can be estimated in terms of output variability. Each project will have some mix of both *fixed* costs, which do not change with size or operational parameters, and *variable* costs, which do change with operational modifications. These combine to yield a cost-curve that relates size or output with unit costs. When building a new water project, the size is often a critical design decision. Larger projects, while more expensive, often yield lower unit costs.

Other even more advanced and data-intensive accounting methods exist. *Life-cycle cost accounting* includes costs for building, operating, and maintaining a piece of infrastructure over time that incorporates the multitude of operational considerations and monetized benefits over the expected timeframe of the infrastructure. Such accounting can be expanded even further to include *multiple* *benefits* that are not necessarily monetary. For stormwater, such life-cycle and multi-benefit assessments are just starting to be used by municipal and county governments in project planning. The EFC tools support cost estimates that include life-cycle costs, but at this time do not directly help accumulate multi-benefit quantifications, which can often be highly-project specific.